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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
10/643,790	08/15/2003	Yih-Min Tu	JCLA10858	4787

23900 7590 10/04/2007

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EXAMINER	
DSOUZA, JOSEPH FRANCIS A	
ART UNIT	**PAPER NUMBER**
2611	
MAIL DATE	**DELIVERY MODE**
10/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/643,790	TU ET AL.	
	Examiner	Art Unit	
	Adolf DSouza	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-9 and 11* is/are rejected.

7)☒ Claim(s) *10,12,13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Arguments

1. Applicant's arguments with respect to claims 1, 3 and 8 (Remarks 9/6/2007, pages 10 – 13) have been considered but are moot in view of the new ground(s) of rejection.

Argument: Applicant amended independent claims 1, 3 and 8 to add: "the switching varactor unit has at least a first diode and a second diode, the positive ends of the first diode and the second diode are commonly coupled to a node, and the node receives a frequency selection voltage" and then argued that the prior art does not disclose such a varactor unit (Remarks 9/6/2007, pages 10 – 13).

Response: Examiner is introducing a new reference Weiss (US 5,629,652) that has a varactor unit that meets the new claim limitations.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer (US 6,091,304) in view of Lansford et al. (US 6,163,568) and further in view of Weiss (US 5,629,652).

Regarding claim 1, Harrer discloses a voltage controlled oscillator (VCO) device (Abstract; Fig. 1, element 140), the VCO device comprising:

a switching varactor unit, having a first terminal and a second terminal, wherein the switching varactor unit produces a capacitance, according to a frequency-selection voltage (Fig. 3, elements 32, 33; column 2, lines 43 – 56; column 5, lines 32 – 46; wherein the first and second terminals are the ends of 32 and 33 connected to 301 and 302 respectively and the capacitance is controlled by switching signal 303 and 304 for unit 32 and 307 and 308 for unit 33);

a VCO core, having a first output terminal, wherein the switching varactor unit is coupled in parallel with the VCO core at the first output terminal and the second output terminal to produce a capacitance effect with respect to the capacitance, so as to adjust a frequency constant of the VCO core (Fig. 3,elements R1, C1, VC1, VC2, R2, C2, L1, 301, 302; column 2, lines 43 – 56; column 4, lines 59 – 65; wherein the VCO core is the main resonant portion comprising elements R1, C1, VC1, VC2, R2, C2, L1; the first and second output terminals of the VCO core are 301 and 302 respectively; and 111 and 112 being the input and output terminals of the entire unit).

Harrer does not disclose that the VCO is used in an FSK system and that the varactor unit has the positive terminals of the diodes connected and that the common node receives the frequency selection unit.

In the same field of endeavor, however, Lansford discloses a VCO suitable for use in a frequency shift keying (FSK) system (Fig. 2, element 7c; column 1, lines 6 – 15; column 2, lines 23 – 32).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Lansford, in the system of Harrer because this would allow the VCO to be used to generate an FSK signal, as disclosed by Lansford.

In the same field of endeavor, however, Weiss discloses the switching varactor unit has at least a first diode and a second diode, the positive ends of the first diode and the second diode are commonly coupled to a node, and the node receives a frequency selection voltage, such that the switching varactor unit produces a capacitance according to the frequency selection voltage (Fig. 2, elements CR1, CR2, V_{TUNE}; column 1, lines 41 – 55).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Weiss, in the system of Harrer because this would allow the capacitance to be controlled by the tuning signal, thereby allowing the VCO frequency to be changed.

4. Claims 2 , 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer (US 6,091,304) in view of Lansford et al. (US 6,163,568) and further in view of Suto (US 20030052744) and Weiss (US 5,629,652).

Regarding claim 2, Harrer discloses the switching varactor unit comprises a switching diode unit for receiving a mode selection signal with at least one bit data wherein the switching diode unit includes: a plurality of diode pairs coupled in parallel, wherein the diode pairs can be switched on with respect to a quantity of the mode selection signal so as to produce the capacitance (Fig. 3, element 32, S1, VC11, 303, 304 and corresponding elements for unit 33; column 2, lines 43 – 56; column 5, lines 31 - 46).

The combined invention of Harrer and Lansford does not disclose that the diode pair has one common terminal coupled to the switching unit.

In the same field of endeavor, however, Suto discloses the diode pair has one common terminal coupled to the frequency-selection voltage and another terminal coupled to the first terminal and the second terminal, respectively (Fig. 5, elements 511, 512; page 3, paragraphs 39 – 40; which have the common terminal connected to the switching signals 500c and 500b respectively. When element 511 is used in place of element 32 in Fig. 5 of Harrer, the other terminals of the diode pair would be coupled to the first and second terminals respectively.

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Suto, in the combined system of

Harrer and Lansford because this would allow the VCO resonant frequency to be changed according to the switching varactor unit, as disclosed by Suto.

Regarding claim 11, Harrer discloses each diode of diode pairs also coupled with a switching device controlled by the mode selection signal (Fig. 3, element S1, 303, 304; column 5, lines 31 – 46; wherein the switching device is element S1).

5. Claims 3 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer (US 6,091,304) in view of Lansford et al. (US 6,163,568) and further in view of Suto (US 20030052744), Joshi et al. (US 5,650,754), Bomba (US 3,962,640) and Weiss (US 5,629,652).

Regarding claim 3, Harrer discloses a switching varactor unit, having a first terminal and a second terminal, wherein the switching varactor unit produces a capacitance, according to a frequency-selection voltage (Fig. 3, elements 32, 33; column 2, lines 43 – 56; column 5, lines 32 – 46; wherein the first and second terminals are the ends of 32 and 33 connected to 301 and 302 respectively and the capacitance is controlled by switching signal 303 and 304 for unit 32 and 307 and 308 for unit 33);

and a VCO core, having a first output terminal, a second output terminal complementary to the first output terminal, and an input terminal, wherein the switching varactor unit is coupled in parallel with the VCO core at the first output terminal and the second output terminal to produce a capacitance effect with respect to the capacitance, so as to adjust a frequency constant of the VCO core (Fig. 3,elements R1, C1, VC1, VC2, R2, C2, L1,

301, 302; column 2, lines 43 – 56; column 4, lines 59 – 65; wherein the VCO core is the main resonant portion comprising elements R1, C1, VC1, VC2, R2, C2, L1; the first and second output terminals of the VCO core are 301 and 302 respectively; and 111 and 112 being the input and output terminals of the entire unit).

Harrer does not disclose an FSK system, a frequency selection unit, VCO buffers, a PLL unit coupled to the buffer and that the varactor unit has the positive terminals of the diodes connected and that the common node receives the frequency selection unit.

In the same field of endeavor, however, Weiss discloses the switching varactor unit has at least a first diode and a second diode, the positive ends of the first diode and the second diode are commonly coupled to a node, and the node receives a frequency selection voltage, such that the switching varactor unit produces a capacitance according to the frequency selection voltage (Fig. 2, elements CR1, CR2, V_{TUNE}; column 1, lines 41 – 55).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Weiss, in the system of Harrer because this would allow the capacitance to be controlled by the tuning signal, thereby allowing the VCO frequency to be changed.

In the same field of endeavor, however, Lansford discloses a VCO suitable for use in a frequency shift keying (FSK) system (Fig. 2, element 7c; column 1, lines 6 – 15; column 2, lines 23 – 32).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Lansford, in the system of Harrer because this would allow the VCO to be used to generate an FSK signal, as disclosed by Lansford.

In the same field of endeavor, however, Bomba discloses a frequency selection unit, for receiving an input signal and a mode selection signal, and exporting a frequency-selection voltage according to the mode selection signal (Fig.1, elements 31, 39, 34; column 6, lines 41 – 43; column 8, lines 62 – 64; wherein the frequency selection unit is interpreted as the combination of the elements 31 and 39, the input signal comes from the pulse generator 34, the mode selection signal is signal 41 and the frequency selection voltage that is generated is the output 31t of the ramp generator 31).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Bomba, in the system of Harrer because this would allow the VCO frequency to be changed according to a voltage, as disclosed by Bomba.

In the same field of endeavor, however, Joshi discloses a first VCO buffer, coupled to the first output terminal of the VCO core and exporting a desired frequency and a second VCO buffer, coupled to the second output terminal of the VCO core (column 2, lines 55 – 66; Fig. 1, element 140;wherein the VCO buffer is the element 140. Joshi shows one buffer, which can be used at both outputs of VCO core in the Applicant's invention);

and a phase locked loop unit, coupled between an output of the second VCO buffer and the input terminal of the VCO core to form a feedback loop and produce the desired frequency (Fig. 1, loop formed by elements 140, 50, 20, 30, ... 100; column 4, line 26 – column 6, line 41; wherein the second VCO buffer is element 140).

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the VCO buffers and PLL, as taught by Joshi, in the system of Suto because this would allow isolate the two outputs in a PLL system, as disclosed by Joshi.

Regarding claim 4, Harrer discloses the switching varactor unit comprises a switching diode unit for receiving a mode selection signal with at least one bit data wherein the switching diode unit includes: a plurality of diode pairs coupled in parallel, wherein the diode pairs can be switched on with respect to a quantity of the mode selection signal so as to produce the capacitance (Fig. 3, element 32, S1, VC11, 303, 304 and corresponding elements for unit 33; column 2, lines 43 – 56; column 5, lines 31 - 46).

The combined invention of Harrer and Lansford does not disclose that the diode pair has one common terminal coupled to the switching unit.

In the same field of endeavor, however, Suto discloses the diode pair has one common terminal coupled to the frequency-selection voltage and another terminal coupled to the first terminal and the second terminal, respectively (Fig. 5, elements 511, 512; page 3, paragraphs 39 – 40; which have the common terminal connected to the switching

signals 500c and 500b respectively. When element 511 is used in place of element 32 in Fig. 5 of Harrer, the other terminals of the diode pair would be coupled to the first and second terminals respectively.

Therefore it would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use the method, as taught by Suto, in the combined system of Harrer and Lansford because this would allow the VCO resonant frequency to be changed according to the switching varactor unit, as disclosed by Suto.

Regarding claim 5, Harrer discloses the diode pairs comprise bipolar junction varactor diode or metal-oxide semiconductor (MOS) varactor diode (column 5, lines 44 – 46; wherein the MOS varactor diode is interpreted as being one of the "other devices" that are MOS).

Regarding claim 6, Harrer does not disclose each diode of the diode pair is coupled to the switching device controlled by the mode selection signal.

In the same field of endeavor, however, Suto discloses each diode of the diode pairs also coupled with a switching device controlled by the mode selection signal (Fig. 5, element 551a, 511b, 500c; wherein the two diodes 551a and 551b are controlled by lines 500c).

Regarding claim 7, Harrer discloses the switching varactor unit further comprises a decoder to decode the mode selection signal into a plurality of channels with respect to

the diode pairs for use in control the switching device, so whether each of diode pairs outputting their capacitance or not is controlled by the channels respectively (Fig. 3, element 160; column 6, lines 29 – 45).

Claim 8 is directed to method/steps of the same subject matter claimed in apparatus claim 3 and therefore, is rejected as explained in the rejection of claim 3 above.

Claim 9 is directed to method/steps of the same subject matter claimed in apparatus claim 7 and therefore, is rejected as explained in the rejection of claim 7 above.

Allowable Subject Matter

6. Claims 10, 12 – 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Other Prior Art Cited

7. The prior art made of record and not relied upon is considered pertinent to the applicant's disclosure.

The following patents are cited to further show the state of the art with respect to VCOs whose frequencies are controlled by varactor circuits:

Wynn (US 4,602,222) discloses a circuit for band switching a voltage controlled oscillator.

Martin (US 4,914,695) discloses a Method and apparatus for frequency control of multiple oscillators using a single frequency-locked-loop.

Martin et al. (US 5,686,864) discloses a Method and apparatus for controlling a voltage-controlled oscillator tuning range in a frequency synthesizer.

Bult et al. (US 20010041548) discloses a variable gain amplifier for low voltage applications.

Duncan et al. (US 6,426,680) discloses a system and method for narrow band PLL tuning.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adolf DSouza whose telephone number is 571-272-1043. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Adolf DSouza
Examiner
Art Unit 2611

AD

DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER